2008-07

N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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http://hdl.handle.net/2027.42/64943
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Research Design

Contributors
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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Incremental Control with Design
Concepts Relevant to Research Design (1)

Causality
A  ⟷  B
Pressure  ⟷  Ulcer

Multicausality
Years smoking  ⟷  Heart disease
High fat diet  ⟷  Heart disease
Limited exercise  ⟷  Heart disease
• Probability: Likelihood of an outcome
• Bias: Slanting findings
• Manipulation: Treatment
• Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- **Controlling the treatment**
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

• Controlling measurement
  ○ Reliability
  ○ Validity
  ○ Number of measurement methods
  ○ Types of instruments
Elements of a Strong Research Design (5)

- **Controlling extraneous variables**
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

Is there a treatment?

Yes

Is the treatment tightly controlled by the researcher?

No

Is the primary purpose examination of relationships?

Yes

Will the sample be studied as a single group?

No

Descriptive Design

Quasi-Experimental Study

Will a randomly assigned control group be used?

No

Correlational Design

Experimental Study

Yes

Is the original sample randomly selected?
Selecting a Descriptive Design

Examining sequences across time?

Yes

Following same subjects across time?

No

Data collected across time

No

Descriptive Design

Comparative Descriptive Design

Yes

Studying events partitioned across time?

No

Cross-sectional design

Trend Analysis

No

Repeated measures of each subject

Yes

Yes

Single unit of study

Longitudinal Study

Case Study

No

Cross-sectional design with treatment partitioning

Yes

Longitudinal design with treatment partitioning
A Typical Descriptive Design

Clarification ➔ Measurement ➔ Description ➔ Interpretation

Phenomenon of Interest

Variable 1 ➔ Description of Variable 1
Variable 2 ➔ Description of Variable 2
Variable 3 ➔ Description of Variable 3
Variable 4 ➔ Description of Variable 4

Interpretation of Meaning
Development of Hypotheses

Research Design 16
A Comparative Descriptive Design

Group I {variables measured} → Describe → Comparison of Groups on Selected Variables → Interpretation of Meaning

Group II {variables measured} → Describe → Development of Hypotheses
## Selecting the Type of Correlational Design

<table>
<thead>
<tr>
<th>Describe relationships between/among variables?</th>
<th>Predict relationships between/among variables?</th>
<th>Test theoretically proposed Relationships?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive correlational design</td>
<td>Predictive correlational design</td>
<td>Model testing design</td>
</tr>
</tbody>
</table>

Research Design
A Descriptive Correlational Design

Measurement

Research Variable 1 → Description of variable → Examination of Relationship → Interpretation of Meaning → Development of Hypotheses

Research Variable 2 → Description of variable
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

Control Group?
  No
  Pretest?
    No
    One-group post-test only design
    Comparison with population values?
    No
    Suggest Reevaluating design
    Yes
    One group pretest/post-test design
  Yes
  Pretest?
    No
    Repeated Measures?
    No
    Strategy for Comparison
    Yes
    Compare treatment & control conditions?
    No
    Yes
Selecting The Type of Experimental Design

- **Pretest**
  - **No**
    - Post-test only control group design
  - **Yes**
    - Repeated Measurements?
      - **No**
        - Examine effects of confounding variables?
          - **No**
            - Pretest/post-test control group design
          - **Yes**
            - Multiple sites?
              - **No**
                - Randomized clinical trials
              - **Yes**
                - Blocking?
                  - **No**
                    - Comparison of multiple levels of treatment
                  - **Yes**
                    - Randomized Block Design
                  - Examination of complex relationships among variables in relation to treatment
      - **Yes**
        - Repeated measures design
        - Nested Designs
## Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Measurement of dependent variables</th>
<th>Manipulation of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>PRETEST</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:**
Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation:**
- Restricted generalizability as control increases

Research Design
Post-Test-Only Control Group Design

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<th>Measurement of dependent variables</th>
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</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td>POST-TEST</td>
</tr>
<tr>
<td>Treatment:</td>
<td>Under control of researcher</td>
</tr>
<tr>
<td>Findings:</td>
<td>Comparison of experimental and control groups</td>
</tr>
<tr>
<td>Uncontrolled threats to validity:</td>
<td>Instrumentation</td>
</tr>
<tr>
<td></td>
<td>Mortality</td>
</tr>
<tr>
<td></td>
<td>Limited generalizability as control increases</td>
</tr>
</tbody>
</table>
## Pain Control Management

### Traditional care
- Unit A
- Unit B
- Unit C
- Unit D

### PRN Medication
- Unit E
- Unit F
- Unit G
- Unit H

### New approach: “Around the clock” medication

<table>
<thead>
<tr>
<th>Primary Nursing Care</th>
<th>Primary Care</th>
<th>No Primary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit A</td>
<td></td>
<td></td>
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<tr>
<td>Unit B</td>
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<tr>
<td>Unit C</td>
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<tr>
<td>Unit H</td>
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</table>
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically
- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design